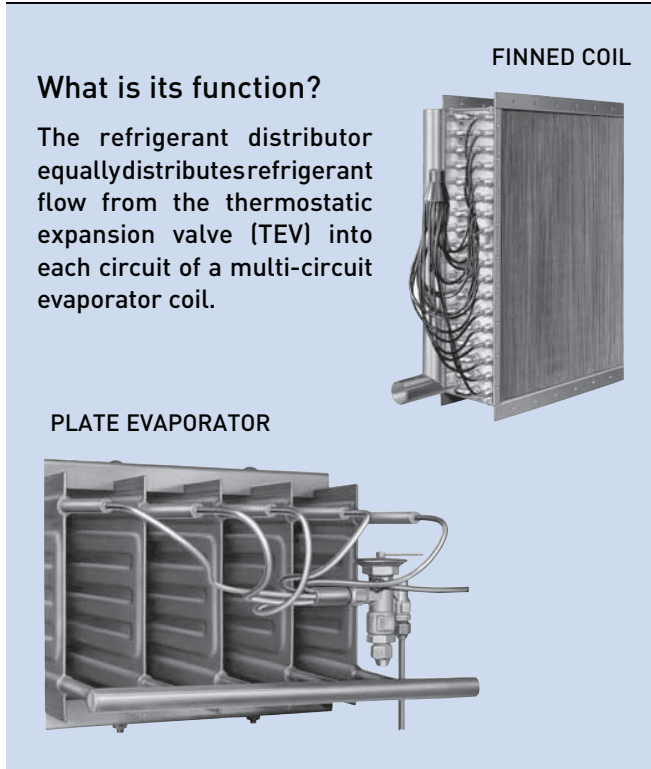


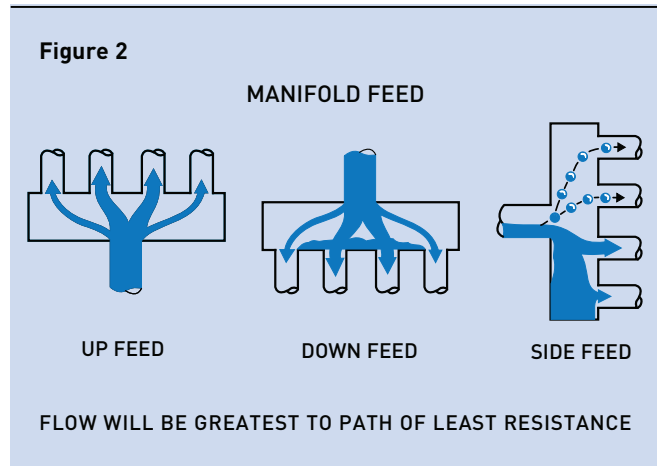
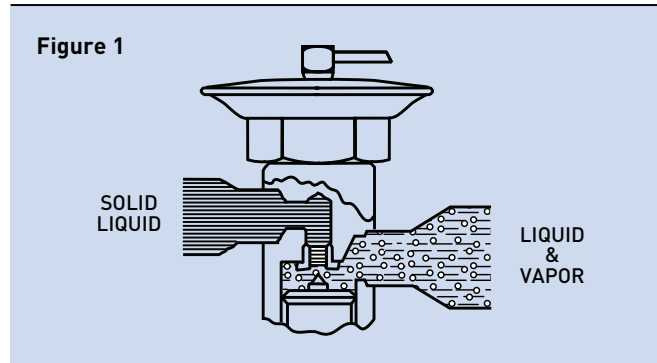
REFRIGERANT DISTRIBUTOR

What is it?

The refrigerant distributor is a device connected to the outlet of a thermostatic expansion valve (TEV). The outlet of the distributor is machined to accept tubing which connects the distributor to each evaporator coil circuit.



amounts of refrigerant. The lower circuits of the evaporator invariably receive the most liquid, possibly causing TEV hunting and floodback problems. The upper circuits are then starved, reducing the effective evaporator surface, see Figure 2.



THE DISTRIBUTION PROBLEM

A portion of the liquid refrigerant passing through the thermostatic expansion valve (TEV) normally flashes, resulting in two-phase (liquid and vapor) flow at the valve outlet, see Figure 1. This mixture is predominately liquid by weight, but the vapor occupies most of the volume. For a typical R-410A application, the percentage, by weight and volume, of liquid and vapor flow entering the evaporator coil are listed below:

REFRIGERANT	% WEIGHT	% VOLUME
Liquid	87	29
Vapor	13	71

The above values are based on 100°F liquid refrigerant entering the TEV, and a 50°F evaporating temperature. In this example, liquid represents 87% of the flow by weight, though it only amounts to 29% of the flow volume.

An additional problem arises due to the fact that liquid and vapor move at different velocities. This is sometimes referred to as slip, since gravity has a greater influence on the liquid portion of the flow.

If a simple header is used to divide the flow into each of the evaporator circuits, the circuits will not receive equal

To achieve proper distribution, the liquid portion of the two-phase flow must be divided equally to each evaporator coil circuit. The solution: [1] mix the liquid and vapor portions of the refrigerant flow; and [2] maintain a homogeneous two-phase mixture until equal portions of the flow are divided into each evaporator circuit.

HOW A SPORLAN DISTRIBUTOR SOLVES THIS PROBLEM

The two-phase refrigerant flow leaving the TEV enters the distributor nozzle. The nozzle increases the velocity of the two-phase flow, mixing its liquid and vapor components. Furthermore, the nozzle is positioned such that flow is focused onto the dispersion cone, equally dividing the mixture into passageways spaced evenly around the cone. The refrigerant is then conveyed, by the distributor tube, to each evaporator circuit.

Pressure drop across the Sporlan distributor creates the high velocity necessary to distribute the refrigerant flow effectively. High velocity is the key to the distributor's success. Pressure drop across the nozzle focuses the flow, and provides the necessary mixing. Pressure drop across the distributor tubes assists in balancing the flow as it enters the distributor passageways. As a result, distributor tube and nozzle sizing is critical to proper distributor operation.